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Original Research Article

Surgical audit of current management practices of ileal perforations presenting in a tertiary care institute of North India

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ABSTRACT

Background: Small bowel perforation is one of the commonest causes of abdominal emergency in India and other tropical countries mostly due to high incidence of enteric fever and tuberculosis. Surgical approach to these patients is standard but the choice of procedure continues to be debated. It is very important to find the appropriate management of these patients to reduce high mortality and morbidity.
Methods: This prospective study on 50 patients of perforation peritonitis with small bowel perforation. After initial resuscitation with intravenous fluids and antibiotics surgery was done by midline incision and three modalities of surgical techniques were compared i.e. primary closure of perforation, resection and anastomosis and ileostomy depending upon the general condition of patient and local condition of gut.
Results: Out of 50 patients, ten underwent primary repair of perforation, four patients were managed with ileal resection and end to end anastomosis and rest 36 patient required faecal diversion in form of ileostomy. Two patients expired in post-operative period that were cases of abdominal tuberculosis.
Conclusion: Primary closure of perforation is preferable in patients with single small perforation with healthy surrounding bowel. Resection anastomosis is advocated in multiple perforations of any size with localized peritonitis of diseased segment pertaining to good general condition of patient. Ileostomy is lifesaving procedure particularly in patients of fulminant enteritis and peritonitis of long duration with associated co-morbidities but requires second surgery for closure.

Keywords: Ileostomy, Peritonitis, Primary closure, Resection anastomosis (RA)

INTRODUCTION

Perforation peritonitis is the most common surgical emergency in India and majority of these are constituted by upper gastrointestinal tract perforation. Despite the availability of modern diagnostic facilities and advances in treatment regimes, the condition is still associated with high morbidity and mortality.[1] The causes of small bowel perforation includes enteric fever being the most common followed by tuberculosis, trauma, nonspecific enteritis, obstructive, radiation enteritis, Crohn`s etc.[2] The incidence of perforation in enteric fever is reported between 0.8% to 18%.[3] Tuberculosis accounts 5-9 % of all small intestinal perforation in India.[4] Surgery is the standard treatment but there is no consensus on the procedure. The mortality ranges from 9% to 43% with survivors having severe wound infection and longer hospital stay. The morbidity from other post-operative complication ranges from 8.8% -71.3%.[5]

Primary closure should be done in patients with short history of symptom and limited faecal contamination

which is better than temporary ileostomy in term of cost effectiveness and complication related to ileostomy. But in delayed cases the severe inflammation and edema of bowel make it friable for handling and suturing of the bowel leading to high chances of leak and hence faecal peritonitis and faecal fistula.[6] Resection of the inflamed small bowel with perforation and end to end anastomosis of the healthy gut has advantage of treating large perforation or multiple perforations and also has no complication related to ileostomy. But some of these patients have high chances of anastomotic leak leading to faecal peritonitis and faecal fistula who are presenting late. Primary ileostomy is found to be superior to other surgery as far as the mortality is concerned especially in moribund patients presenting late in course, where it is lifesaving procedure.[7] Ileostomy causes diversion, decompression and exteriorization. But it associated with many complications including fluid electrolyte imbalance, nutrition deprivation and dehydration etc.[8]

Study at in institute are getting a significant number of patients with small bowel perforations which are, managed with either of the procedure i.e. Simple closure of perforation, resection anastomosis or ileostomy depending upon general and local factors. We carried surgical audit to assess management practices in small bowel perforations and their critical evaluation.

METHODS

A prospective study was carried out on 50 patients of perforation peritonitis with small bowel perforation admitted from emergency, in an apex institute of north India from August 2012 to August 2014. Patients were subjected to different surgical procedures depending upon the general condition of the patients and also the condition of the small intestine.

A detailed history including co-morbid illness, complete physical examination and investigations were done. All the patients were first resuscitated with intravenous fluid, oxygen inhalation etc. Nasogastric aspiration and urethral catheterization was done in every patient. Pre-operative antibiotics, Ceftriaxone (1gm), Amikacin (500mg) and Metronidazole (500mg) given empirically before any culture. After stabilizing the patient haemodynamically, an exploratory laparotomy was done within 24 hours of admission.

The findings were noted in terms of amount and nature of fluid, site, size and number of the perforations and condition of the adjacent bowel. After peritoneal lavage and biopsy of underlying pathology surgical procedure was done according to following criterion.

Primary closure

Single perforation of less than one cm with relatively healthy bowel or two perforations of less than one cm with relatively healthy bowel with an adequate distance from each other. The repair was done with silk 3-0 round body in interrupted manner in full thickness.

Resection and anastomosis

Large single or multiple perforations with relatively healthy bowel were managed by resection and anastomosis. The perforated segment of bowel was mobilized and mesentery carefully visualized for vascular arcades. The point of transaction was selected at sufficient distance from the diseased portion and in the vicinity of a healthy vascular arcade. Non-crushing and crushing intestinal clamps were applied on both ends. The bowel was resected between the clamps and mesentery was opened in V shaped manner. Anastomosis was done by silk 3-0 round body in single layer with interrupted sutures. The mesentery was closed with vicryl 3-0 in interrupted manner.

Ileostomy

Single or multiple perforations with unhealthy bowel and high-risk patients were subjected to ileostomy. Stoma was created at lateral border of rectus muscle at infraumblical bulge after excising the two-cm circular skin disc and dissecting the subcutaneous tissue and incising the anterior rectus sheath in cruciate manner, muscle fibers were separated bluntly and posterior sheath incised and the proximal end of bowel was taken out of the defect in case of end ileostomy and distal end closed with silk 3-0 round body and secured to parities. In loop ileostomy margin of perforation freshened and the loop taken out of the defect. The stoma was fixed to the skin with vicryl 3-0. In all the procedure, a pelvic drain was kept in situ. The abdominal wound was closed in single layer using no-1 loop PDS suture and skin was closed with silk 2-0 reverse cutting in interrupted manner.

A detailed Performa was developed to record information demographic including patients age, sex, BMI, presentation, detailed examination, investigations, procedure done, duration of surgery, blood loss and operative finding. The patient outcome was assessed by duration of hospital stay, wound infection, wound dehiscence, leakage/faecal fistula, intraabdominal collection/abscess, ileostomy related complications and reoperation etc. The complications were managed as per standard guidelines with operative and non-operative means. Patients in which ileostomy was performed were followed up till stoma closure. The large gut was prepared with saline enema and oral polyethylene glycol was given on preoperative day to prepare the small bowel in all cases before stoma closure.

RESULTS

A prospective study was carried out in 50 patients of perforation peritonitis with small bowel perforation admitted from emergency in a tertiary care institute of north India from August 2012 to August 2014. Out of 50

patients ten underwent primary repair of perforation, four patients were managed with ileal resection and end to end anastomosis and rest 36 patient required faecal diversion in form of ileostomy. Two patients expired in post-operative period were of tuberculosis. Two patients were re-operated and lifesaving ileostomy was done following anastomotic leak, one patient was each of primary closure and resection anastomosis group.

Majority of patients were of age group 21-30 years with male preponderance. Male were 4.5 times more common than female patients. Most of the (80%) patients belong to the rural background. Seven patients (14%) had traumatic small bowel perforation out of them five due to roadside accident, one secondary to gunshot and another due to foreign body ingestion with alcohol intoxication. All of 50 patients presented with pain abdomen (100%), the average duration of pain was 5.5 days.

Fever preceded the abdominal symptoms in case of patients with enteric pathology. Vomiting was present in 82% of patients. Abdominal distention and inability to pass feces and flatus were late features were present in 74% and 72% of total patients respectively. Abdominal examination reveals tenderness in all the patients with guarding in 90% of the patients. Mean BMI of the patients was 19.48. Of all the patients 42% had co-morbid conditions out of which chest infection (22%) was the commonest illness. Hematological investigations showed that 52% patients have total leukocyte count more than 11000/cmm and only one had count less than 4000/cmm.

Preoperative urea was raised in 58% of the patients. Widal test was done in 43 cases and was positive in 21 (48.84%) and in three patients clinical finding were suggestive of enteric perforation so test was considered false negative. Blood culture was done in 43 cases out of which only one case was positive for *Salmonella typhi* rests were sterile.

Radiologically there was evidence of pneumoperitoneum in 84% of cases. Ultrasound abdomen was able to pick free fluid in 78% followed by dilated gut loops (32%) and specs of air (24%). In view of clinical suspicion CT scan of abdomen was done to confirm the diagnosis. In six patients, other abnormalities like mesenteric lymphadenopathy and pleural effusion were observed. Typhoid fever accounted for 42% of all cases followed by tuberculosis (20%), traumatic (14%) and nonspecific (24%). All the patients underwent explorative laparotomy, 76% of the patients had a single perforation, out of which 70% had a perforation of size less than 1 cm and located within two feet of ileo-cecal junction (96%) at anti mesenteric border. Large perforations of size 1-2 cm were mostly observed in trauma followed by nonspecific peritonitis.

Histopathological examination was done in all cases of them 14 shows acute enteritis, 10 were suggestive of tuberculosis, and 26 were non-specific peritonitis. Histopathological examination was also done in traumatic perforation showed specific inflammation.

Table 1: Local complications.

Complications	Number of Patients (%)			Total no. of patients (n=50)
	Primary closure (n=10)	Resection anastomosis (n=4)	Ileostomy (n=36)	
Minor wound infection	2	-	10	12 (24%)
Wound dehiscence with major wound infection	-	-	14	14 (28%)
Burst abdomen	1	1	2	04 (8%)
Anastomotic leak	1	1	-	04 (8%)
Intra-abdominal collection	2	1	5	13 (26%)

Wound infection was the commonest post-operative complication and was seen in about 20% of the patients with primary closure and 66.67% of patients with ileostomy. Wound dehiscence with major infection was only seen in ileostomy patients (38.89%).

Burst abdomen was seen in two patients (5.56%) with ileostomy, in one patient with resection anastomosis and in one patient of primary closure. This was found statistically significant (p=0.037). In post-operative period of survived 35 patients of ileostomy, stomal edema was seen in 19 (54.29%) cases and it improved with local application of saline soaked gauze with glycerin. The electrolyte imbalance and dehydration was seen in 22.86% and 5.71% patients of ileostomy respectively and were managed with parenteral fluid resuscitation. Weight loss was observed in nearly half of the patients. Three patients had diarrhea leading to electrolyte imbalance. Peristomal skin excoriation was seen in 12 (34.38%) cases due to early leakage of the stoma bag and was managed accordingly. Prolapse was seen in three and retraction was seen in one case. Parastomal hernia was seen in one patient due to associated pneumonia with productive cough as precipitating factor. Morbidity and mortality was found in

58% and 4% respectively in overall cases of perforation peritonitis. Majority of morbidity and all cases accounting for mortality were observed in ileostomy patients which was statistically significant (p=0.008) and least seen in primary closure group. It was observed that in all three groups majority of cases the operative time was between 1.5-2 hours. Mean duration of time in primary closure group was 60.5±10.39 minutes, resection anastomosis was 116.25±16.007 minutes while for ileostomy 114.16±25.75 minutes and the difference between these group was statistically significant (p=0.001).

Table 2: Ileostomy related complications.

Complications	No. of patients (%) (N=35)
Retraction	1 (2.85%)
Prolapse	3 (8.57%)
Fluid and Electrolyte imbalance	8 (22.86%)
Peristomal skin excoriation	12 (34.28%)
Intestinal Obstruction	7 (20%)
Leakage of ileostomy bag	35 (100%)
Parastomal hernia	1 (2.85%)
Stromal edema	19 (54.29%)
Dehydration	2 (5.71%)
Diarrhoea	3 (8.57%)

Majority of the cases in these groups had comparable post-operative progression in term of appearance of bowel sound, removal of Ryle`s tube and beginning of oral feed. Difference between these group was statistically significant (p<0.002). Majority of patients were discharged between 5-12 days after surgery. Mean duration of stoma creation and closure was 103.02±48.85 days. Stoma closure was delayed (>8 weeks) in 75% cases due to antitubercular therapy, chest infection, malnutrition, waiting period for elective surgery and financial constraints.

DISCUSSION

Peritonitis due to small bowel perforation is commonly encountered in surgical practice. In contrast to western countries where lower gastrointestinal tract perforations predominate, upper gastrointestinal tract perforation constitute the majority of cases in India.[1] Typhoid fever being the most common causes of non-traumatic small bowel perforation while the other causes include tuberculosis, trauma, nonspecific enteritis, obstructive, radiation enteritis, Crohn's etc.[2] Perforation of small bowel has an abrupt onset and rapid downhill course with high mortality. Surgical approach to these patients is standard but the choice of procedure continues to be debated.

Most of series reports simple closure of perforations or resection and anastomosis, in case of multiple perforations. Though creation of stoma is one of the easiest bowel procedures for a surgeon, however complications including parastomal skin irritation, fluid electrolyte imbalance, nutrition deprivation and dehydration, bleeding, ischemia, obstruction, prolapse, retraction, stenosis, parastomal hernia etc.

More-ever stoma associated with impaired quality of life, interference with daily activities, second hospital stay and increased mortality and morbidity associated with stoma closure.[8]

Table 3: Outcome.

Outcome	Number of patients (percentage)			
	Primary closure (n=4)	Resection anastomosis (n=4)	Ileostomy (n=36)	Total (n=50)
Complicated/Morbidity	2 (20%)	1 (25%)	26 (72.23%)	29 (58%)
Non-complicated/ Normal	8 (80%)	3 (75%)	8 (22.23%)	19 (38%)
Mortality	-	-	2 (5.56%)	2 (4%)

Present study was a prospective study of 50 cases of perforation peritonitis with small bowel perforation where analysis of these cases was done with regard to demography, clinical features, investigations and surgical procedures performed. In most of the studies from Asia mean age of presentation was 35 - 40 years, where male outnumbered female by huge margin and same were finding in present study.[1,9-13] Pain was most common symptom present in all patients followed by fever in 84% other symptom were vomiting and constipation were comparable to different studies. Fever was a common symptom in cases of typhoid perforation peritonitis and ileal perforation is usually seen in third week of illness.[1,9,10,12,13]

Abdominal guarding and tenderness were most important clinical signs which were present in present study followed with abdominal distention in 70% cases. Systemic signs like dehydration and shock were also present in fair number of patients.[1,9,10]

Most common co-morbidity encountered was of poor chest condition in 42% cases causing more post-operative complications like pneumonia, poor wound healing and wound dehiscence.[1,14] Majority of patients were poorly nourished with BMI ranging from 16.5-25.8. While obesity was found to have significant risk factor for overall ileostomy complication.[14]

The etiology of perforation was based upon the Widal test, operative finding and histopathological examination. Typhoid accounted for 42% perforations, tuberculosis is seen in 20%, and trauma 14% and rest 24% were non-specific causes. The cause of non-traumatic terminal ileal perforations were enteric fever (62%), non-specific inflammation (26%), obstruction (6%), tuberculosis (4%) and radiation enteritis (1%) as reported by Wani et al.[9] Nandkarni found (56.6%) non-specific cause, typhoid perforations (25%) and tubercular cause (9.3%) as causes of small bowel perforations.[15]

Table 4: Causes of terminal ileal perforation.

Study	Enteric fever	Non-specific	Obstruction	TB	Radiation enteritis	Trauma
Nadkani et al[15]	25%	56.6%	-	9.3%	-	-
Wani et al[9]	62%	26%	6%	4%	1%	15.95%
Mohil RS et al[16]	79%	3%	-	15%	-	3%
Present study	42%	24%	-	20%	-	14%

In present study peritonitis with faeco-purulent contamination was present in all cases where majority of cases 76% of the patients had a single perforation, out of which 70% had a perforation of size less than one cm and located within two feet of ileo-cecal junction (96%) at anti mesenteric border. Wani et al recorded 62% of patients had single perforation and rest were multiple perforation and Adesunkanmi observed 86% of patients had single perforation and 14% of patients had multiple perforation.[5,9]

Patients were subjected to different surgical procedures depending upon the general condition of the patients and also the condition of the small intestine. Ileostomy was the main surgical procedure performed in 36 patients (72%), ten underwent primary repair of perforation these patients had single perforations of small size (<1 cm) located within 60 cm of terminal ileum and had less faecal contamination without any co-morbid condition, four patients were managed with ileal resection and end to end anastomosis because of multiple perforation or large perforation or where segment of bowel was unhealthy where simple closure was not possible and rest two patients were re-operated and lifesaving ileostomy was done due anastomotic leak one patient each from primary closure and resection and anastomosis group. Two patients expired were suffering from tuberculosis.

Table 4: Comparison of present and international studies.

Study	No. of patients	Male/ female	Duration of illness	Presenting features	No. of perforations	Common complications	Mortality
Eggeleston FC et al[19]	78	61/17	>2 weeks	Fever, abdominal pain	90% single	Wound infection	32%
Memonsales-h AB et al[20]	90	60/30	>2 weeks	Fever, abdominal pain	90% single	Wound infection	-
Aziz M et al[21]	72	56/16	2-3 weeks	Fever, abdominal pain	-	Wound infection	Up to 25%
Shaikh GS et al[22]	60	44/16	>2 weeks	Fever, abdominal pain	83.3% single	Wound infection	13.33%
Present study	50	41/9	<2 weeks	Fever, abdominal pain, distention, vomiting	76% single	Wound infection	4%

Ileostomy related complication were seen in 29 patients (80.55%) which was higher than reported by previous studies peristomal edema in 19 (54.29%), fluid electrolyte imbalance in (22.86%), dehydration (5.71%), skin excoriation was seen in 12 (34.28%) due to leakage of stomal devices, prolapsed in three patients, retraction in one patient.[17,18] One patient had peristomal hernia that

had pneumonia and productive cough as precipitating factors. Morbidity was higher (72.23%) in patients who underwent ileostomy as comparison to primary closure and resection anastomosis (21.4%). The overall mortality in present study was 4% which was low as compared to other studies. Wound infection was the most common complication followed by the wound dehiscence, intra-abdominal collection and anastomotic leak which was in accordance with other studies. The other complication was related to ileostomy hampered quality of life with significantly added morbidity to these patients.[19-22]

CONCLUSION

Primary closure of perforation is preferable in patients with single small perforation (<1cm) with healthy surrounding bowel. Resection anastomosis is advocated in multiple perforation of any size with localized peritonitis confined to diseased segment of the bowel with healthy gut beyond the disease along with the good general condition of patient. Ileostomy is lifesaving procedure particularly in patients of fulminant enteritis and peritonitis of long duration with associated co-morbidities but has higher morbidity due to ileostomy related complications and need of second surgery for closure. Primary closure and resection anastomosis though appears appealing specially in emergency setup are not free of complications, faecal fistula is life threatening out of them with a very high mortality rate.

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